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AN IMPROVED APPARATUS FOR MIXING INSECTICIDAL DUSTS

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During the course of a series of experiments with derris and cube dusts against the pea aphid (Illinoia pisi Kalt.) difficulty was experienced in securing a thorough mixture of the toxic material and the diluent. Furthermore, as an activator or conditioner was frequently added, it was desirable that these compounds should be thoroughly and uniformly mixed with the dust.

It was found that a very effective method of securing this thorough mixing was to place the material to be mixed, together with a number of smooth stones, in a cylindrical metal container and then rotate the container or drum for different periods of time.

The apparatus which was used to rotate the drum was a modification of one described by Laurence L. Quill, under the title of "An Inexpensive Ball Mill," in Industrial and Engineering Chemistry, Analytical Edition, Vol. 8, No. 1, Jan. 15, 1936.

To reduce the speed of the motor, the speed reducer described in Quill's apparatus may be used, or a countershaft with pulleys may be employed. In the apparatus described herein a countershaft was used.

The details of construction are shown in figure 1. The rear roller is not geared to the motor but is an idler roller. The front or power roller is driven by ordinary V-belts attached through a countershaft to a one-fourth horsepower, alternating-current motor.

Different speeds may be obtained by using different sized pulleys. The use of a 2-inch pulley on the motor driving a 10-inch pulley on the countershaft, then a 5-inch pulley on the other end of the countershaft driving an 8-inch pulley on the roller, results in a roller speed of 220 revolutions per minute. This is the maximum speed that should be employed with a cylinder 13 inches in diameter (such as a 10-gallon milk can).

Substituting a 2-inch pulley instead of the 5-inch pulley on the countershaft to drive a 10-inch pulley on the roller will result in a roller speed suitable for cylinders 6 to 9 inches in diameter.

The rollers are made of standard 3-inch galvanized pipe (about $3\frac{1}{2}$ inches outside diameter). The power roller should be covered with friction tape or with a length of motorcycle inner tube to provide additional traction between the roller and the cylinder. Metal plugs are welded into the ends of each roller, and a piece of steel shaft is inserted through the plugs to act as a bearing shaft. Standard babbitt or bronze bearings may be used to support the shafts.

The rollers, of course, may be made in any desired length. The idler roller is adjustable and may be placed close to the drive roller when small cylinders are being used, or at a distance when cylinders of a larger diameter are being employed.

Almost any cylindrical can or drum may be used, depending upon the quantity of dust to be mixed. It should have a smooth inner surface and must have a tight fitting cover which can be securely fastened. For mixing from 15 to 25 pounds of dust, a regular 10-gallon milk can is very satisfactory. About three or four quarts of smooth stones the size of hens' eggs are used in a container of this size.

Heavy, straight-sided 2-, 3-, and 5-gallon ice-cream containers have been used for mixing smaller batches of dust. Such a can is shown in place on the rollers in figure 2. The covers on these cans were fastened by bolts welded or soldered to the inner surface of the can near the top. These bolts protruded through holes drilled in the cover. Heavy paper gaskets were used to prevent leakage.

These containers were provided with extra covers, with a hole drilled in the exact center, to be used when liquids were incorporated with the dust. The liquids were incorporated by atomizing them into the revolving cylinders with a small paint spray atomizer, using 20 to 30 pounds of air pressure. The cylinder was rotated for 20 to 30 minutes after the liquids had been added to secure a thorough mixture.

Derris and cube dusts mixed with this apparatus have proven to be very toxic against the pea aphid, and it is believed that as a result of the thorough mixing the effectiveness of the dusts has been greatly increased.

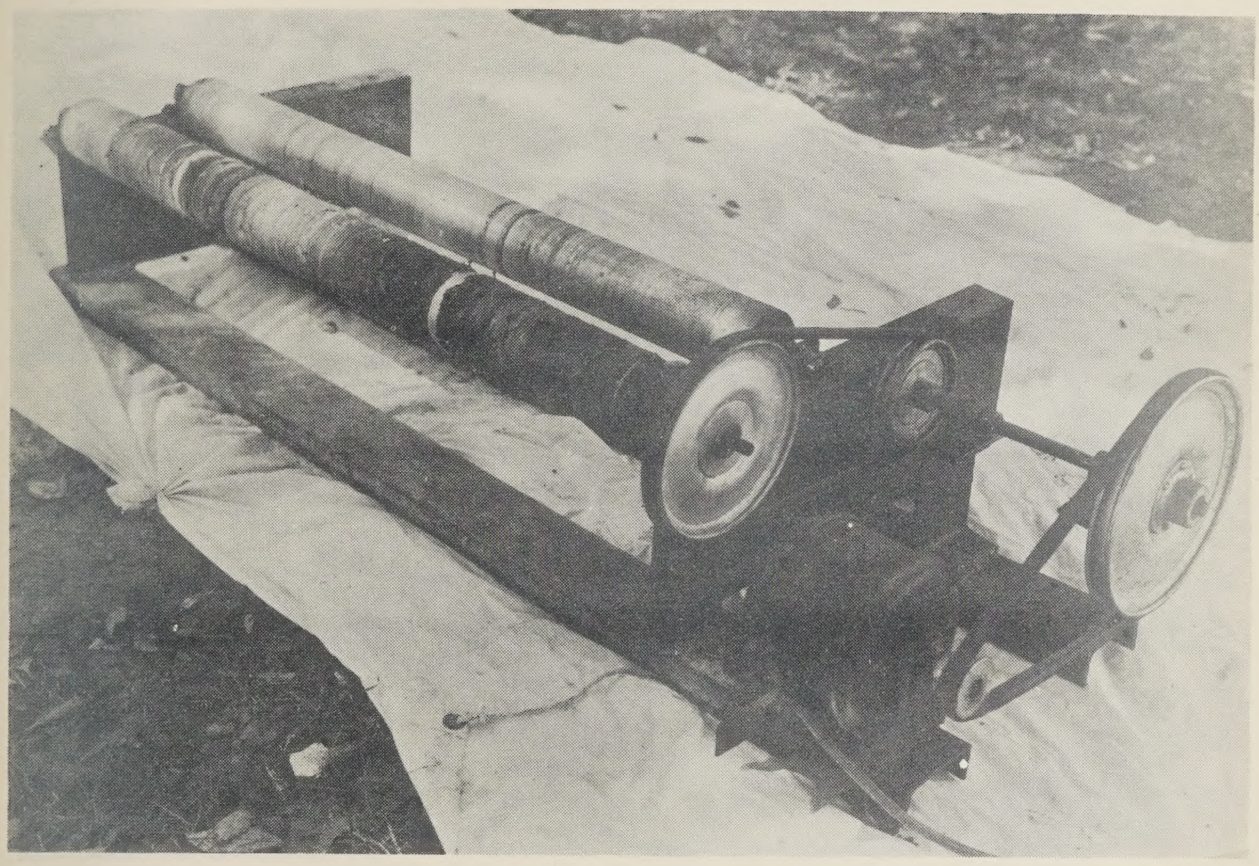

Figure 1.--Framework of ball mill. Power roller in front, idler roller in rear; frame of channel iron; counter-shaft with various sized pulleys for reducing and varying speed; one-fourth horse-power motor for power.

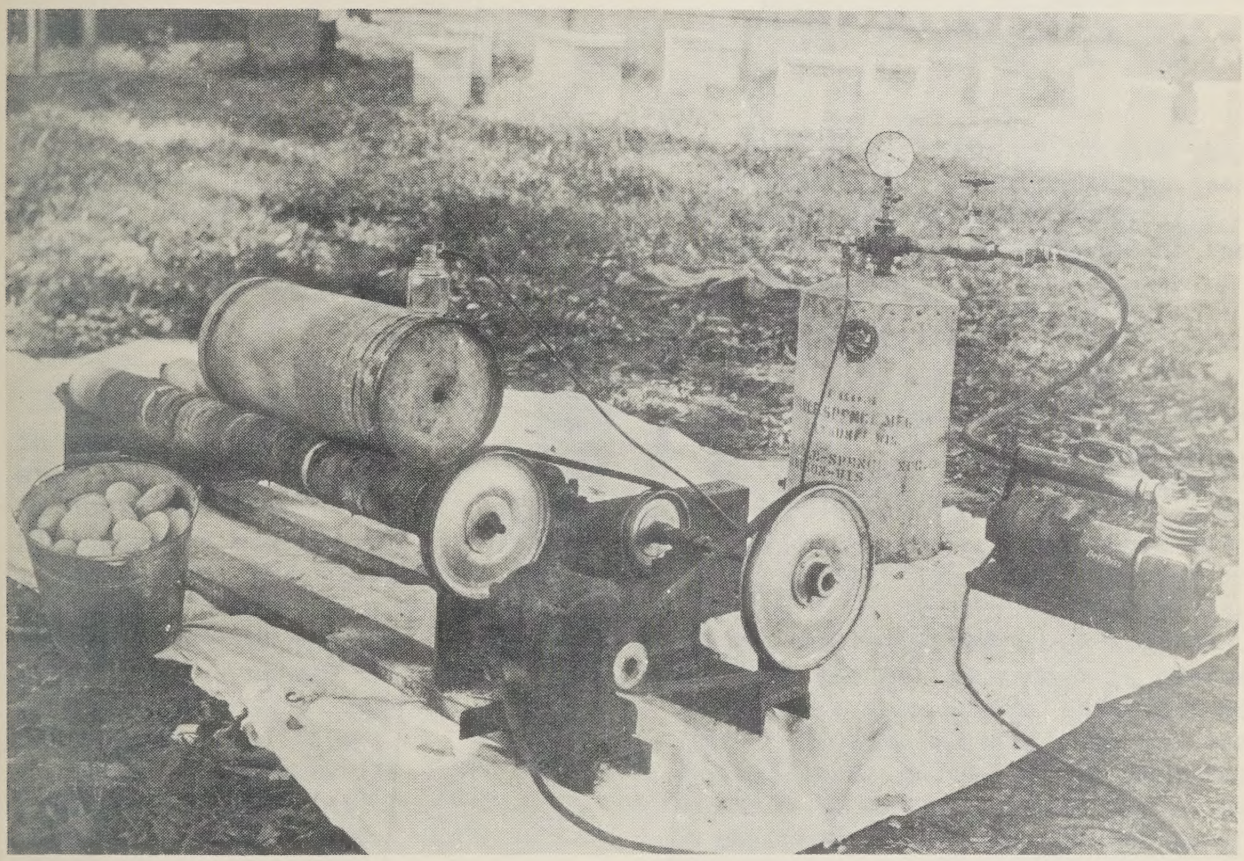

Figure 2.--Complete outfit for mixing conditioned derris dusts. Pail of stones used in drum; 10-gallon ice-cream drum in place on rollers; atomizing jar on drum; compressed-air tank for supplying constant pressure; motor and air compressor in one unit at extreme right.